

AMENDMENT TO THE CLAIMS

1. (currently amended): A head for use with a moving magnetic medium ~~of a rotating disc~~, the head comprising:

a perpendicular writing element including a main pole having a main pole tip, a return pole connected to the main pole at a back gap and having a return pole tip, ~~the return pole located downstream of the main pole relative to the moving magnetic medium rotating disc and connected to the main pole at a back gap~~, a write gap between the main and return poles, and a conductive coil adjacent between the main and return poles and ~~adapted to induce magnetic flux therein~~, wherein an area of a magnetic medium disc-facing surface of the main pole tip is less than an area of a magnetic medium disc-facing surface of the return pole tip; and

a perpendicular reading element positioned upstream of the perpendicular writing element relative to the moving magnetic medium rotating disc and including a top shield, a bottom shield upstream of the top shield, and a read sensor positioned between the top and bottom shields. ~~and~~

~~a non magnetic layer separating the top shield from the writing main pole.~~

2. (original): The head of claim 1, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoZrNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

3. (currently amended): The head of claim 1, ~~wherein the non magnetic layer is formed of a non magnetic insulating material~~

including a non-magnetic layer separating the top shield from the writing main pole.

4. (original): The head of claim 3, wherein the non-magnetic layer is formed of silicon oxide (SiO_2), silicon nitride (Si_3N_4), aluminum oxide (Al_2O_3), or tantalum oxide (Ta_2O_5)

5. (original): The head of claim 1, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

6. (original): The head of claim 5, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3), silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

7. (original): The head of claim 1, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

8. (original): The head of claim 1, wherein the gap layer defines a write gap of approximately 1 micrometer or less.

9. (original): A disc drive storage system including the read/write head of claim 1.

10. (currently amended): A head for use with a moving magnetic medium ~~of a rotating disc~~, the head comprising:

a perpendicular writing element including a main pole having a main pole tip, a return pole connected to the main pole at a back gap and having a return pole tip, ~~the return pole~~ located downstream of the main pole relative to the moving magnetic medium ~~rotating disc~~ and ~~connected to the main pole at a back gap~~, a write

gap between the main and return poles, and a conductive coil adjacent ~~between the main and return poles and adapted to induce magnetic flux therein~~, wherein an area of a magnetic medium ~~disc-facing surface of the~~ main pole tip is less than an area of a magnetic medium ~~disc-facing surface of the~~ return pole tip; and

a perpendicular reading element positioned downstream of the perpendicular writing element relative to the moving magnetic medium ~~rotating disc~~ and including a top shield, and a read sensor positioned between the top shield and the return pole, ~~wherein the return pole serves as a bottom shield for the read sensor.~~

11. (original): The head of claim 10, wherein the main and return poles are formed of a magnetically permeable material selected from a group consisting of CoZr, CoCzNb, Ni₄₅Fe₅₅, FeN, FeAlN, cobalt-iron (CoFe), cobalt-nickel-iron (CoNiFe), nickel-iron (NiFe), and iron (Fe).

12. (original): The head of claim 10, wherein the write gap is approximately 1 micrometer or less.

13. (original): A disc drive storage system including the head of claim 10.

14. (currently amended): A head for recording perpendicularly oriented magnetic patterns to a moving magnetic medium ~~rotating disc~~, the head comprising: main and return poles separated by a write gap, the write gap having leading and trailing edges, the leading edge is defined by the main pole and is positioned upstream of the trailing edge, which is defined by the return pole, relative to the moving magnetic medium rotation of the disc, wherein the main pole includes a writing edge adjacent the

write gap for defining transitions between adjoining magnetic patterns recorded to the magnetic medium, and

~~writing edge means for defining transitions between adjoining magnetic patterns recorded to the disc at the leading edge of the write gap.~~

15. (currently amended): The head of claim 14, wherein the main pole includes a main pole tip having a magnetic medium disc-facing surface whose area is less than an area of a magnetic medium disc-facing surface of a return pole tip of the return pole, the head includes:

a conductive coil between adjacent the main and return poles adapted to induce magnetic flux therein;

a perpendicular reading element upstream of the main pole relative to the moving magnetic medium and including a top shield, a bottom shield upstream of the top shield relative to the moving magnetic medium ~~rotating disc~~, and a read sensor positioned between the top and bottom shields; and

a non-magnetic layer separating the top shield from the main pole.

16. (original): The head of claim 15, wherein a thickness of the non-magnetic layer is approximately 1 micrometer or greater.

17. (original): The head of claim 15, wherein the non-magnetic layer is formed of a conductive layer sandwiched between insulating layers.

18. (original): The head of claim 17, wherein the conductive layer is copper (Cu), aluminum (Al), tantalum (Ta), or tungsten (W), and the insulating layers are aluminum oxide (Al_2O_3),

silicon oxide (SiO_2), tantalum oxide (Ta_2O_5) or silicon nitride (Si_3N_4).

19. (currently amended): The head of claim 14, wherein the main pole includes a main pole tip having a magnetic medium ~~dis-~~ facing surface whose area is less than an area of a magnetic medium ~~dis-~~ facing surface of a return pole tip of the return pole, the head includes:

a conductive coil ~~between~~ adjacent the main and return poles and adapted to induce magnetic flux therein; and

a perpendicular reading element positioned downstream of the return pole relative to the moving magnetic medium and including a top shield, and a read sensor positioned between the top shield and the return pole, ~~wherein the return pole serves as a bottom shield for the read sensor.~~

20. (new): A head for use with a moving magnetic medium, the head including a perpendicular writing element comprising:

a main pole; and

a return pole located downstream of the main pole relative to the moving magnetic medium.

21. (new): The head of claim 20, wherein:

the main pole includes a main pole tip; and the return pole includes a return pole tip having a magnetic medium facing surface whose area is greater than an area of a magnetic medium facing surface of the main pole tip.

22. (new): The head of claim 20 including a reading element positioned downstream of the writing element relative to the moving magnetic medium.

23. (new): The head of claim 20 including a reading element positioned upstream of the writing element relative to the moving magnetic medium.

24. (new): The head of claim 20, wherein the magnetic medium is formed on a disc.